ABSTRACT

The present invention generally relates to chemical, biological, and/or biochemical reactor chips and other reaction systems such as microreactor systems, as well as systems and methods for constructing and using such devices. In one aspect, a chip or other reaction system may be constructed so as to promote cell growth within it. In certain embodiments, the chips or other reaction systems of the invention include one or more reaction sites. The reaction sites can be very small, for example, with a volume of less than about 1 ml. In one aspect of the invention, a chip is able to detect, measure and/or control an environmental factor such as the temperature, pressure, CO_2 concentration, O_2 concentration, relative humidity, pH, etc. associated with one or more reaction sites, by using one or more sensors, actuators, processors, and/or control systems. In another aspect, the present invention is directed to materials and systems having humidity and/or gas control, for example, for use with a chip. Such materials may have high oxygen permeability and/or low water vapor permeability. The present invention, in still another aspect, generally relates to light-interacting components suitable for use in chips and other reactor systems. These components may include waveguides, optical fibers, light sources, photodetectors, optical elements, and the like.